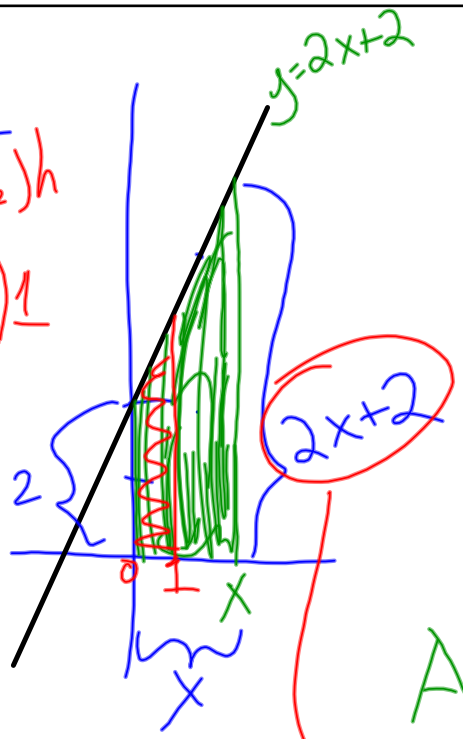
6.1/12

$A_{trap} = \frac{1}{2}(b_1+b_2)h$

$A_{0\to1} = \frac{1}{2}(2+4)1$

$= 3$



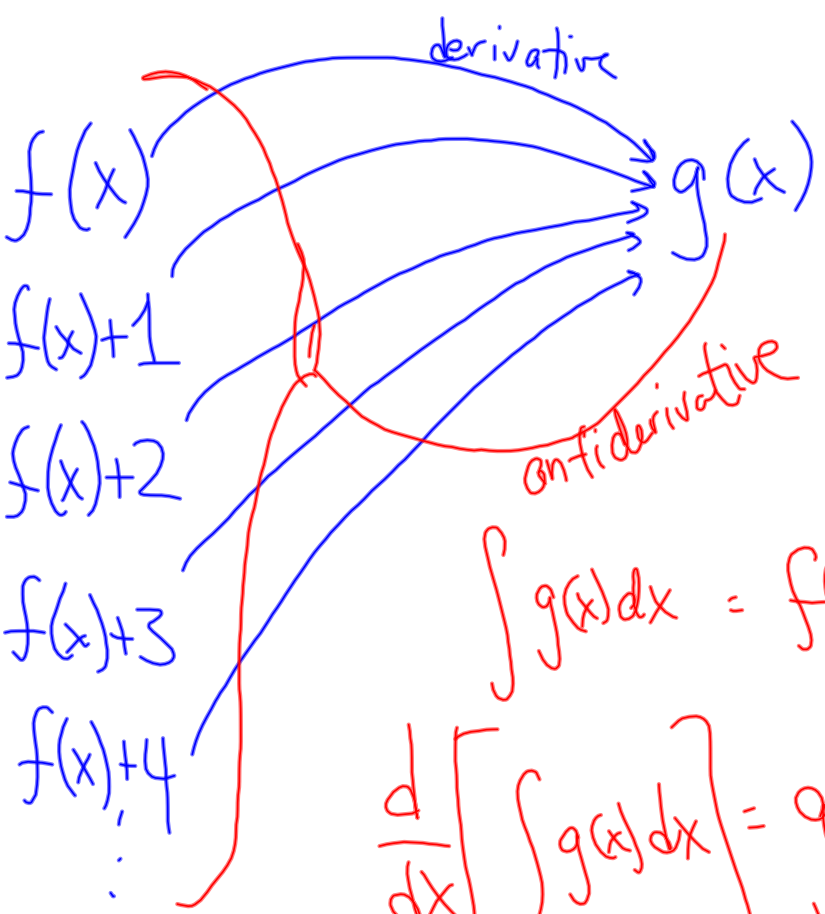
Area
- under $y = 2x+2$
- shape is a trapezoid
- between $x=0$ and a general "x" is:

$A = \frac{1}{2}(2+(2x+2))x$

$A = 2x + x^2$

$A' = 2+2x$

6.2 Derivatives and Anti-derivatives



anti-derivative are also called INDefinite integrals

$\int$ is an integral sign

$$\int g(x)\,dx = f(x) + C$$

$$\frac{d}{dx}\left[\int g(x)\,dx\right] = g(x)$$

$$\int \frac{d}{dx}\left(f(x)\right)dx = \int g(x)\,dx$$

$$= f(x) + C$$

Dec 7-7:29 AM

$\int 0\,dx = C$ $\boxed{1, 2, 3, -17, \pi, e}$ whose derivative is = 0.

constant of antidifferentiation

$\int 1\,dx = \boxed{x + C}$ whose derivative is = 1

$\int 2\,dx = \boxed{2x + C}$ whose derivative is = 2

$\int k\,dx = \boxed{kx + C}$

Antiderivatives

$\int 2x\,dx = \boxed{x^2 + C}$ function whose derivative is $= 2x$

$\int 3x\,dx = \boxed{\frac{3}{2}x^2 + C}$ function whose derivative is $= 3x$

$\int 3x^2\,dx = x^3 + C$

Preview of Coming attractions

we call these INDEFINITE integrals

is there such a thing as a DEFINITE INTEGRAL?

Dec 7-7:29 AM

$$\int e^x\,dx = \boxed{e^x + C}$$ function whose derivative is e^x

$$\int \cos x\,dx = \sin x + C$$

$$\int \sin x\,dx = -\cos x + C$$

$$\int \sec^2 x\,dx = \tan x + C$$

$$\int \sec x \tan x\,dx = \sec x + C$$

Dec 7-7:29 AM

is there an antiderivative-version of the POWER RULE?

Power Rule

→ multiply by exponent

→ subtract 1 from exponent

Antiderivative Power Rule

→ add 1 to exponent

→ divide by that new exponent

Hint

$$\frac{d}{dx}\left(x^n\right) = nx^{n-1}$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Dec 7-8:08 AM

$$\int \frac{1}{x}\,dx = \ln x + C$$

$$\int \frac{1}{x^2+1}\,dx = \tan^{-1} x + C$$

$$\int \frac{1}{\sqrt{1-x^2}}\,dx = \sin^{-1} x + C$$

p 380

$$\int c f(x)\,dx = c\int f(x)\,dx$$

$$\int f(x)+g(x)\,dx = \int f(x)\,dx + \int g(x)\,dx$$

$$\int f(x)-g(x)\,dx = \int f(x)\,dx - \int g(x)\,dx$$

No direct analogs to product rule or quotient rule

[[chain rule * coming up]]

Dec 7-8:19 AM

6.2/ 1-34

a) $\frac{d}{dx}\sqrt{1+x^2} = \frac{d}{dx}(1+x^2)^{\frac{1}{2}} = \frac{1}{2}(1+x^2)^{-\frac{1}{2}}(2x)$

$= \frac{2x}{2\sqrt{1+x^2}} = \frac{x}{\sqrt{1+x^2}}$

so $\int \frac{x}{\sqrt{1+x^2}}dx = \sqrt{1+x^2} + C$